

ENERGY – GERMANY

I. Statistical Information -- Primary Energy Consumption

1999	Ktoe (I)	%
Coal	80,546	23.7
Petroleum	133,380	39.4
Natural Gas	72,290	21.3
Hydro/Wind	2,169	0.6
Nuclear	44,227	13.1
Other	6,368	1.9
TOTAL	338,980	100.0

(I) thousand tons of oil equivalent

II. Evaluation of Sector – Electrical Power Systems, Oil and Gas Field Machinery and Services and Renewable Energy Equipment

- A) On a scale of 1 (low) to 5 (high), evaluate the priority given by the host government to energy development: **5**
- B) On a scale of 1 (low) to 5 (high), evaluate country's receptivity to U.S. products & services: **2**
- C) On a scale of 1 (heavy) to 5 (little), evaluate competition for U.S. exporters from local domestic suppliers: **1**
- D) On a scale of 1 (heavy) to 5 (little), evaluate competition for U.S. exporters from third-country suppliers: **3**
- E) On a scale of 1 (severe) to 5 (little), evaluate overall effect of trade barriers on U.S. exports of products and services: **3**

III. Narrative Information

The German energy sector is undergoing considerable changes. Structural developments, new legal decisions, and controversial discussions make it nearly impossible to draw a clear picture of this sector. The following issues dominate energy discussions and developments:

- the government's objective to discontinue power generation from nuclear power plants;
- the deregulation of the electricity and natural gas markets;
- mergers & acquisitions with direct consequences for energy generation and distribution in eastern Germany;
- the establishment of power exchanges; and
- the increasing utilization of renewable energy.

The implementation of the German Energy Deregulation Law in April 1998 was the starting point of the liberalization process. Since September 1998, Germany's new social democratic-green government coalition has been developing programs to discontinue nuclear power and promote renewable energy (mainly wind power, hydropower and solar energy utilization). The question, however, when the government will reach a final decision on the phase-out of nuclear energy remains open. Discontinuing nuclear power generation would not only affect existing contracts with nuclear fuel-processing firms in France and the UK, but also Germany's commitments to reduce CO₂ emissions. Global climate changes and limited natural resources of oil, gas, and coal have led to political discussions about a so-called "energy change" (German term: "Energiewende"). "Energiewende" describes a transfer to renewable energy, activities to reduce overall energy consumption, and to improve energy effectiveness.

Drastic changes characterized the German electricity market during the past two years. Germany has become one of the most competitive electricity markets in Europe where (mainly large industrial) customers profit from sharp price reductions and the opportunity to select electricity suppliers. In contrast to most other European countries and to experiences made by deregulating the German telecommunications market, Germany has not installed a regulatory authority for the energy industry sector that sets binding limits on utilities' rates for electricity and transmission. Hence, competition is regulated by voluntary agreements among industry associations on electricity transmission (Verbaendevereinbarung I and II). Germany has chosen negotiated third party access (nTPA) for networks instead of regulated third party access (rTPA).

Following the liberalization of the national electricity market, the deregulation process in the German natural gas market has just started and will dominate developments in the energy sector in the near future. As a consequence of all developments, mergers and takeovers appear to dominate the public discussion. Widely publicly discussed are the mergers between the energy giants RWE - VEW (to RWE AG) and VEBA - VIAG (to E.ON AG). These mergers, which still have to be approved by German and European competition authorities already raised numerous concerns regarding a possible energy

duopoly in Germany. They will also have consequences for the energy market in eastern Germany, where VEAG (Vereinigte Energiewerke AG) dominates the energy generation and the entire energy distribution based on a decision made shortly after German unification. Major German energy companies hold shares in VEAG, but the mergers will require a restructuring of VEAG and, consequently, eastern Germany's energy market, which hopefully will lead to competition and markets that are open for foreign companies.

Furthermore, the German energy market is developing from a seller's into a buyer's market. Electricity is becoming a commodity, which can be traded on German power exchanges. In June 1999, an expert commission appointed by the German Federal Economics Ministry chose Frankfurt am Main over Hanover, Dusseldorf and Leipzig as the primary location for a German power exchange. Leipzig nevertheless continues with its plans to open up a separate energy-trading site for the German market, although experts doubt the economic feasibility of two power exchanges. The Leipzig Power Exchange (LPX) is scheduled to start with electricity spot trading in Germany in June 2000. Six to nine months later, LPX plans to enter the futures trading business. The European Energy Exchange (EEX) in Frankfurt will open in fall 2000. Initial plans to focus on the futures market only were revised in October 1999 when EEX announced to enter the spot market in Frankfurt as soon as possible. Frankfurt and/or Leipzig could become key players for energy trading in Europe - mainly because Germany represents the largest national energy market in Western Europe.

Electrical Power Generation and Transmission Equipment (ELP)

1998	Capacity (MW)	Production (gross-GWh)
Nuclear	23,450	161,500
Coal	54,400	291,500
Gas	22,100	51,500
Hydro	10,000	20,500
Wind	2,875	4,400
Miscellaneous	2,500	22,700
TOTAL	115,325	552,100

In 1999, Germany's energy generation was still dominated by lignite/hard coal and uranium. Nuclear power plants produced 35 percent of electricity (two percent more than in 1998), lignite power plants 26 percent (27 percent in 1998) and hard coal power plants 25 percent (27 percent in 1998). Eight percent of electricity was produced by natural gas power plants, one percent generated from oil and the remaining five percent were generated from renewable energy.

Hence, the country meets 51 percent of its energy need from coal. Germany has its own natural hard coal (mainly in western Germany) and lignite resources (mainly in eastern

Germany), which will be available for the next 40 years at least. But presently hard coal can be bought much cheaper on world markets than extracted domestically. Consequently, German hard coal mining has been scaled back for years while imports of hard coal tripled since 1990. Large quantities of oil, natural gas, and uranium have to be imported.

In 1999, Germany's economy grew faster than energy consumption. Industrial users and private households were able to save DM 15 billion (USD 7.5 billion) of electricity costs due to declining energy prices and a more efficient use of energy. The German energy suppliers sold approximately kWh 458 billion in 1999 compared to kWh 456 billion in 1998. Kilowatt-hours 39.5 billion were exported in 1999 compared to kWh 38.8 billion in 1998. Imports of electricity accounted for kWh 40.5 billion (kWh 38.1 billion in 1998). The largest electricity consumers are: industry/mining (45 percent), private households (29 percent), services/public offices (22 percent), traffic and agriculture with two percent each.

Oil & Gas Industry and Equipment Market

Germany's oil imports decreased by 3.9 percent to a total level of 103.6 million tons in 1999. But prices for imported oil increased by 34 percent to DM 24.6 billion (approximately USD 12 billion). The oil was mainly imported from Russia (28 million tons) and Norway (20.7 million tons). Germany extracts about three millions tons of oil domestically per year. In terms of primary energy consumption, mineral oil is Germany's most important energy source followed by coal and gas.

According to the EU Gas Directive of August 1998, the members of the European Union have to begin to open their gas markets by August 2000. Germany is right in the middle of preparing the deregulation of the national gas market following the model provided by the deregulation process in the electricity market. It is expected that an Association Agreement (Verbaendevereinbarung) on gas will be announced on August 10, 2000. As outlined above, it is up to the main players and associations in the gas market to come up with such an agreement without a regulatory authority approach by the federal government. Experts differ on what will happen after the implementation of the new agreement. Some predict price fluctuations (including increases), market consolidation and job losses. But most experts agree that the medium term changes will be less dramatic than observed in the German electricity and telecommunication markets mainly because gas cost reductions are almost impossible. According to recently published studies, approximately 90 percent of the gas costs are fixed costs. Margins of 0.2 cents on a wholesale level and approximately 0.8 cents on distribution levels do not allow major cost reductions.

Germany's gas market is characterized by a very complex structure mainly involving three layers of the gas business on national, regional and local levels and a very extensive supply chain. Responsibilities for gas transport and gas deliveries are divided across these levels.

Natural gas currently represents the fastest growing energy source in Germany. But the country's gas market is linked to developments in the oil sector. Hence, consumer prices increased by 11 percent in 1999. Natural gas was mainly imported from Russia, Norway and the Netherlands; 22 percent came from national gas sources. Germany reached a record level of natural gas extraction in 1999 with an amount of 21.2 billion cubic meters (seven percent more than in 1998). Experts estimate that the national gas generation will decrease in the foreseeable future.

Nuclear Energy

The German social democratic-green government coalition is planning to discontinue nuclear power generation as soon as possible. This objective is accompanied by controversial public discussions. One of the issues discussed is that German nuclear power companies will seek to recover stranded costs. Another issue under discussion is the transportation of nuclear waste.

In 1999, a total of 19 nuclear power plants with a combined capacity of 23,450 MW generated kWh 168.4 billion of electricity in Germany - five percent more than in 1998 with kWh 161.5 billion (according to the Association of German Electricity Supply Companies – VDEW). Nuclear power accounts for 35 percent of Germany's entire power generation. Due to current government plans, renewable energy should partially compensate for the planned discontinued nuclear power. Experts agree, however, that the nuclear phase-out will last at least 20 years.

Renewable Energy Equipment (REQ)

The Association of German Electricity Supply Companies stated that the market share of renewable energy increased from 5.2 percent in 1998 to 5.9 percent in 1999, equaling a total of kWh 28.7 billion of energy produced by renewable energy sources. Although this is still a very small portion of the entire energy generation in Germany, numerous R&D efforts, manifold application areas for renewable energy products, and federal and regional economic development programs heavily promote renewable energy. Specifically, the German government promotes the utilization of renewable energy as follows:

- with a so-called 100,000 roof solar energy program launched in January 1999 to support the installation of 100,000 photovoltaic facilities with 3 kilowatt each (300 MW altogether);
- with subsidies or loans of a combined total of DM one billion (USD 500 million) offered for the construction of renewable energy facilities until the end of the year 2003;
- by supporting initiatives of economic and environmental associations (like the "Solar Initiative 2000").

On April 1, 2000 a renewable energy law (Erneuerbare-Energien-Gesetz – EEG) became effective in Germany. It defines among others fixed prices for renewable energy fed into

the national grid. It is the objective of the German government to increase the share of renewable energy to ten percent in 2010 and to fifty percent until the year 2050. So far, the generation and distribution of renewable energy has been too expensive to compete with conventional energy sources. The renewable energy market in Germany has an annual turnover of approximately DM five billion (USD 2.5 billion).

A look at Germany's map of renewable energy generation reveals that the north is dominated by wind power (North Sea/Baltic Sea) while the south mainly utilizes solar energy. 1999 was Germany's most successful year in the history of wind energy utilization. The trend is toward a combined utilization of renewable energy sources like wind power, biogas, and solar energy to secure a stable supply with electricity. The so-called energy mix of the future can deliver significant cost savings.

Wind Power

Germany became world champion in wind power utilization in 1998 and had another record year in 1999. 7,879 wind turbines with a rated power of 4,445 MW were installed altogether by the end of last year. The generation of electricity through wind energy counted for kWh 5.4 billion – kWh 1.1 billion more than in 1998. This is enough to serve more than 1.5 million households, making Germany a global leader in the number of households serviced by wind-generated energy.

1,674 new wind power facilities with an overall energy capacity of approximately 1,600 MW were installed in 1999 alone. Compared to 1998, the newly installed capacity increased by fifty percent. The average power of newly installed turbines comes up to 930 kW per unit in 1999 – which means that the megawatt wind power facility has become a standard facility in Germany. The country's largest wind farm in the state of Brandenburg went into operation in 1999 with a capacity of 62 MW.

According to recent estimates, up to 20,000 jobs were created in the wind power sub-sector in Germany over the past years. The wind energy sales figures for 1999 are DM 1.36 billion (approximately USD 700 million).

Germany's wind power capacity is expected to grow to 10,000 MW within the next ten years. It could then reach a share of 3.5 percent of the energy production based on a stable energy consumption in Germany. The first German offshore wind power project SKY 2000 (with 60 wind turbines) at the Baltic Sea (state of Schleswig-Holstein) is reportedly going to be operational in the year 2000. Further research activities in this renewable energy sub-sector will focus on improved wind forecast technologies to select the best wind park locations and on the development of multi-megawatt-turbines.

Photovoltaic Cells

The share of photovoltaic energy production in Germany is 0.004 percent in comparison to the entire energy generation. An expected increase of 30 percent per year would change this share to 0.13 percent in 2010, which is an indication of the potential of this

sub-sector provided there is an increase of R&D efforts in order to introduce competitive technologies for photovoltaic cells over the next years.

The largest amount of sold power generated by German photovoltaic technologies was reached in 1997 with 13.7 MW. Due to less economic promotion support by federal and state governments in 1998, only 10 MW could be achieved in this year. Cumulatively, 50 MW of photovoltaic modules with an annual solar energy production of kWh 35 million kWh were installed in Germany by the end of 1998.

Annual sales of photovoltaic components reached approximately DM 2.5-3.5 billion (up to USD 2 billion) in Germany. Shell Solar Deutschland GmbH currently operates the world's largest photovoltaic cell production plant in Gelsenkirchen with a capacity of 25 MW. Shell also established Germany's first solar gas stations.

In order to promote solar energy, the German government has established an economic promotion program (worth DM one billion or USD 500 million) called 100,000-roof solar energy program (100,000 Dächer-Programm), aiming at an overall capacity of 300 MW within the next five years. Target groups are private households and facility management operators.

Hydrodynamic Power

Experts evaluate hydrodynamic power as the energy source of the third millennium. It is Germany's most important single source of renewable energy. The share of energy generated by hydropower increased from kWh 17.3 billion in 1998 to kWh 19.5 billion in 1999. Hydrodynamic power is considered a source that can compensate potential failures of wind power or photovoltaic facilities. Latest developments in the hydropower sub-sector involve tests of special windmills on the seabed.

Biogas

Biogas is gaining an increasing importance for power generation in Germany. The number of biogas facilities increased from approximately 100 in 1990 to more than 450 in 1998. Technological improvements of facilities for biogas generation and distribution stimulated this development and led to a decline in equipment prices. Today, Germany has taken over the technological leadership for biogas facilities. Biogas could also play an increasing role as a gasoline substitute for private cars.

Heat Pumps

The Association of German Electricity Supply Companies predicts that the new generation of technologically sophisticated, electrically powered heat pumps will play a major role in renewable energy utilization. The association forecasts that the number of newly installed units will continue to increase until it reaches the level of 10,000 installations annually after the year 2000. Between 1993 and 1998 the number of installed heat pumps rose from 500 to 3,150.

IV. Major Procurement or Private Projects on the Horizon

As a result of the German energy deregulation law, which supports an open energy market, there will continue to be numerous procurement opportunities throughout Germany. There will be tenders from municipalities and industrial companies. Information on many of these tenders will be printed in the official procurement registers ("Amtsblatt"). In general, these tender announcements appear with little lead-time. American companies interested in bidding are encouraged to have a local partner or local presence in order to be able to stay abreast of these opportunities.

The German energy industry plans to invest DM 43 billion (approximately USD 20 billion) between 1999 and 2003. Fifty percent of the investments will go to renewal and improvements of the energy grid. The construction and modernization of power plants will require one third of the planned investments according to the Association of German Electricity Supply Companies. Some sources fear that due to the liberalization of the market, investments may decline.

V. Major Trade Events/Fairs

Name: Power.2000
Location: Duesseldorf
Dates: October 10-12, 2000
Frequency: every two years
Organizer: Messe Duesseldorf GmbH
Stockumer Kirchstrasse 61
40474 Duesseldorf, Germany
Tel: 011-49-211-4560-01
Fax: 011-49-211-4560-668
Internet: <http://www.tradefair.de>
Industry: International Energy Trade Fair
(premier trade show and conference in October 2000)

Name: enertec
Location: Leipzig
Dates: March 13-16, 2001
Frequency: every two years
Organizer: Leipziger Messe GmbH
Projektteam enertec 2001
PF 100720
4007 Leipzig, Germany
Tel: 011-49-341-678-8293
Fax: 011-49-341-678-8292
E-mail: enertec@leipziger-messe.de
Internet: www.enertec-leipzig.de
Project Manager: Dr. Deliane Traeber

Industry: International Energy Trade Fair
(premier trade show in Leipzig, 2001)

Name: Hannover Messe

Location: Hannover

Dates: April 23-28, 2001
April 15-20, 2002

Frequency: annual

Organizer: Deutsche Messe AG
Messegelaende
30521 Hannover
Tel: 011-49-511-89-0
Fax: 011-49-511-8932626
E-mail: webmaster@messe.de
Internet: <http://www.messe.de>

Industry: World's Leading Trade Fair for Industry, Automation,
Innovation

Main Product Groups in the Energy Sector: energy production and generation, energy management and trading, renewable energy, energy conversion, energy storage, energy distribution, energy transmission, measuring and analysis equipment, control equipment, power stations, remote control equipment, components, services

Beside the above listed energy trade events which mainly focus on the traditional energy industry there are a number of new German trade shows exclusively devoted to the renewable energy industry sector. Leading German renewable energy trade shows are:

- “SolarEnergy” (Berlin, June 8-10, 2000/June 7-9, 2001/June 6-8, 2002);
International Trade Show for Photovoltaic and Solar Thermionics
- “Intersolar” (Freiburg, July 7-9, 2000); solar technology exhibition and congress
- “Erneuerbare Energien” (Stuttgart-Boeblingen, next show in 2002); covering all renewable energy sub-sectors.

More background information on renewable energy trade shows and respective publications in Germany can be provided by The Commercial Service office in Leipzig (contact address given at the end of this report).

VI. Country's Methods of Procurement

German power plants seeking power-generating equipment issue a tender, for which they publish detailed project specifications. Firms wishing to bid for the project must pass through a pre-qualification round, in which they must show, among other things, that they are able to meet German construction and safety standards. Firms that pass the pre-qualification round may then participate in the bid. While most German tenders of interest to U.S. companies are published in the English version of the “Supplement to the Official Journal of the European Communities” all written correspondence between purchasing entities and potential suppliers - i.e. requests for tender related documents and the bids themselves – must be conducted in German. German purchasing entities rarely

process late or incomplete tenders. It is essential, therefore, that potential suppliers submit all required documents prior to any stated deadline. U.S. companies without a subsidiary or an agent in Germany may find themselves at a disadvantage when attempting to participate in tenders requiring negotiations with bidders in a competitive range, concerning installation, maintenance, or other post-delivery services.

VII. Means of Financing Procurement

In the eastern part of Germany, subsidies that are granted by the respective state (Land) can play a major role in financing projects. Federal and EU subsidies are also available for “innovative” technologies.

VIII. Points of Contact

A) U.S. Government
U.S. Consulate General
The Commercial Service
Birgit Lehne, Senior Commercial Specialist
Wilhelm-Seyfferth-Strasse 4
04107 Leipzig, Germany
Tel: 011-49-341-213-8440
Fax: 011-49-341-213-8441
E-mail: Birgit.Lehne@mail.doc.gov
<http://www.usembassy.de/usfcs>

B) Host Country Government
Federal Ministry for Economics and Technology
Scharnhorststrasse 34-37
10115 Berlin, Germany
Tel: 011-49-30-2014-9
Fax: 011-49-30-2014-7010
<http://www.bmwi.de>

Contact information for the sixteen German state economics ministries can be obtained from The Commercial Service at the U.S. Consulate General Leipzig (as listed above).

C) Associations and Utilities
Information on leading German energy associations, energy corporations and utilities can be obtained from The Commercial Service at the U.S. Consulate General Leipzig (as listed above).

(USD 1 equals DM 2)